CHIEF DIRECTORATE OF OCCUPATIONAL HEALTH AND SAFETY

Major Hazard Installations Inspectors Training

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Introduction

- Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment;
- 1976 : Europe, Italian town of Seveso suffered a catastrophic accident involving dangerous substances and people and animals were fatally injured and environment was highly polluted.
- The incident prompted the adoption of legislation on the prevention and control of dangerous substances incidents.
- Seveso Directive (Directive 82/501/EEC)
- Seveso II Directive (Directive 96/82/EC).
- Seveso III (Directive 2012/18/EU)
- the changes in EU legislation on the classification of chemicals and the increased rights for the public to access information and justice.

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Introduction

- The UK adopted the Seveso III directive and developed COMAH Regulations, which lay down rules for:
  - the prevention of major accidents involving dangerous substances,
  - seeking to limit as far as possible the consequences for human health and the environment of such incidents

- South Africa adopted the COMAH Regulations, requirements in 1998 and published the first MHI Regulations in July, 2001
  - criteria for classification is embedded in the definition of an MHI

(a) Stores prescribed quantities either temporarily or permanently

(b) Processes, stores…..substances in a form that has a potential to cause a major incident

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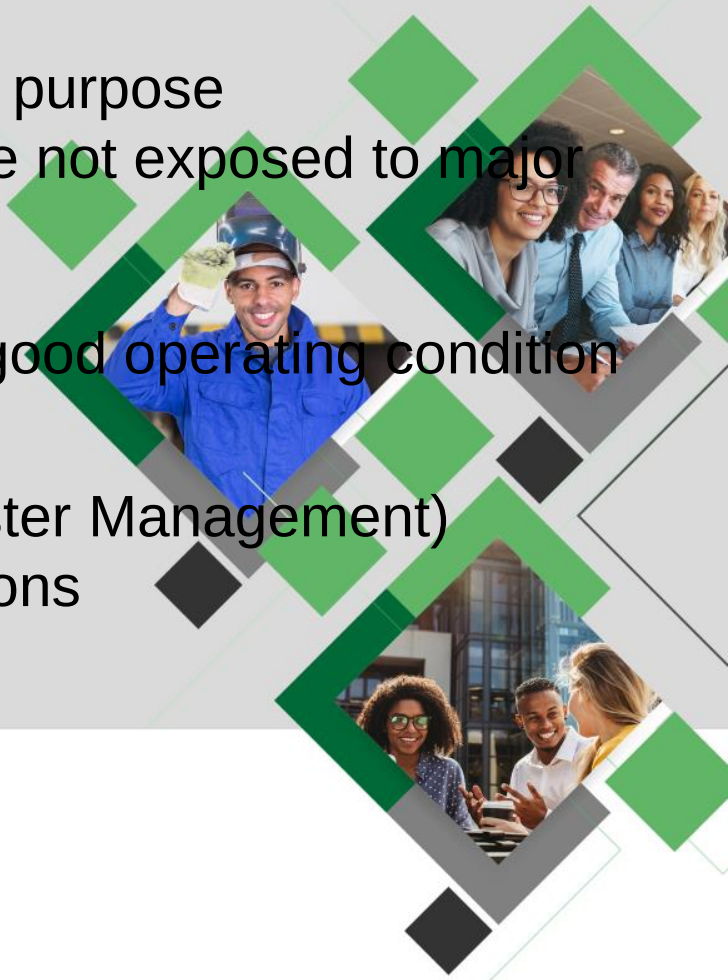
Purpose

to protect the health and safety of employees and public members from dangerous substances (Chemicals)

- **How?**
  - MHI are designed and built for safety purpose
  - Located at areas where the public are not exposed to major incidents
  - Emergency plan is in place
  - Integrity is maintained in a safe and good operating condition
- **Co Regulators**
  - Local Government (Approval & Disaster Management)
  - DEEF/LG: Environmental Authorisations
  - DoT : transit of the substance



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Sectors likely to be designated under MHI includes the following:

- Chemical manufacturing and storage,
- Oil and gas production and storage,
- Petrochemical plants,
- MHIs within Explosives workplaces,
- Large-scale storage of hazardous or dangerous substances.

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Gaps, with MHI Reg's 2001

- No prescribed quantities
- Use of Schedule 8, GMR
- No requirement for formal approval of MHIs by Local Government
- No formal registration of MHI
- No standardised way of conducting a risk assessment and developing an Emergency plan
- Classification not holistic and was subjective from one AIA to another
- No indication of use of software designed for QRA
- etc.

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What are the changes?

New Requirements, 2022	Phased out, 2001
Qualified the definition of MHI	No prescribed Quantities
Additions of new terms	Emergency ~~Preparedness~~ plan
23 functional Regulations 26 total Regulations+ Annexures	10 functional Regulations 11 total Regulations
1-9, 16,,18,19,20 : Admin… 10-13: Technical 14-15: Local Government 17: Training 21&22: SANAS&AIA	1-3:Admin.. 4&5: Technical 6&9: Local Government SANAS+AIA (Act)

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What are the changes?

New Requirements, 2022	Phased out, 2001
1. Definitions	1. Definitions
2. Scope of Applications	2. Scope of Applications
3. Management of MHI	
4. Notification	3. Notification
5. Registration	
6. Renewal	
7. Revocations and Suspensions	
8. Alteration of Information	
9. Sharing of Information	

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What are the changes?

New Requirements, 2022ernment	Phased out, 2001
10. Risk Assessment	5. Risk Assessment
11. MIPP	
12. Safety Report	
13. LTO	
14. Duties of Local Government	9. Duties of Local Government
15. Emergency Plan	6. Emergency Preparedness Plan
16. Reporting of risk and Emergencies Occurrences	7. Reporting of Risk and Emergencies Occurrences
17. Information and Training Alteration of Information	
18. Duties of Suppliers	8. Duties of Suppliers

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What are the changes?

New Requirements, 2022ernment	Phased out, 2001
19. Payable Fees	
20. MHI Advisory Committee	
21. AIA	
22. Functions of AIA	
23. Closure	10. Closure
24. Offences and Penalties	11. Offences and Penalties
25. Short Title	
26. Repeal of MHI Regulations,2001	
Annexures A, B, C, D, E & Form a & Form B	

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CHAPTER 1: Dangerous GOODS Classification Chart

Types of dangerous goods

Class 1- Explosives

Class 2- Flammable gases

Class 3- Flammable liquids

Class 4- Flammable solids

Class 5- Oxidizing substances

Class 5.2- Organic peroxides

Class 6- Toxic & infectious substances

Class 7- Radioactive material

Class 8- Corrosives

Class 9- Miscellaneous goods

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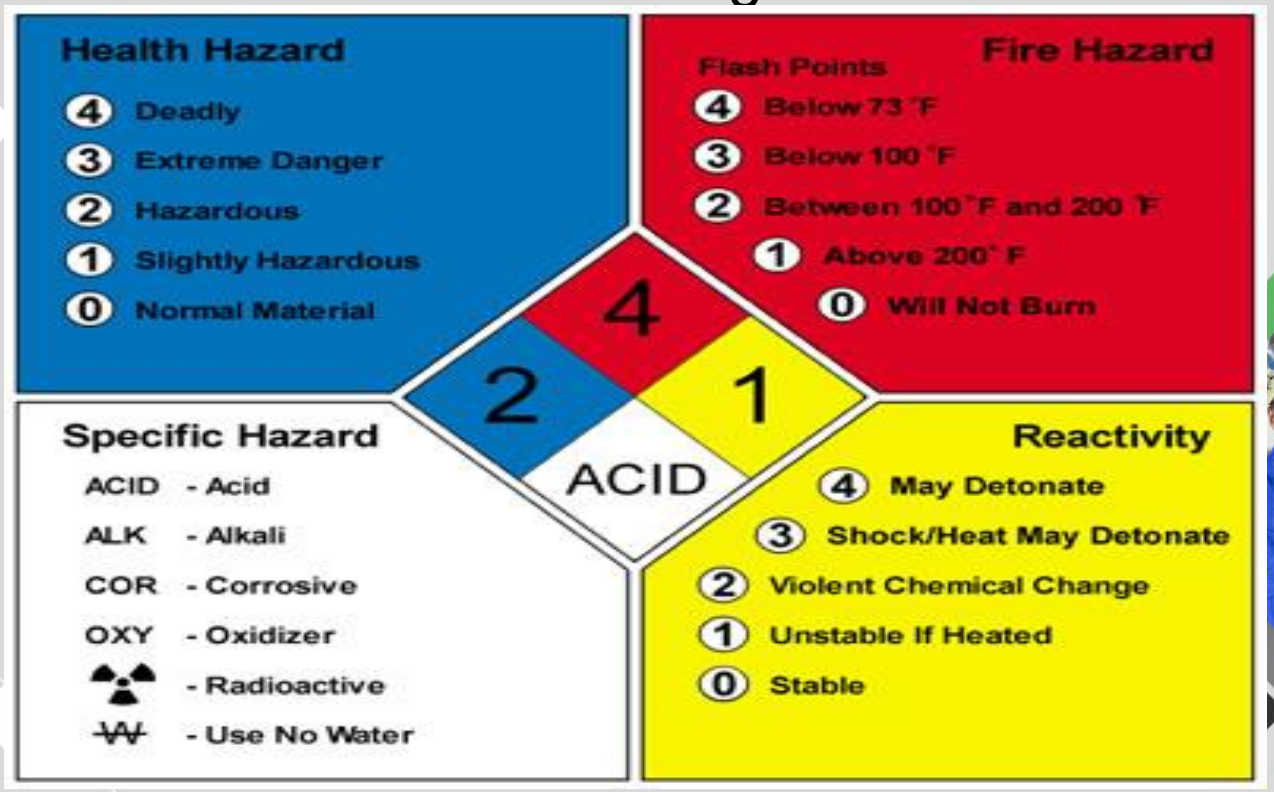
CHAPTER 2 : Hazard Categories



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QUANTITATIVE RISK ASSESSMENT

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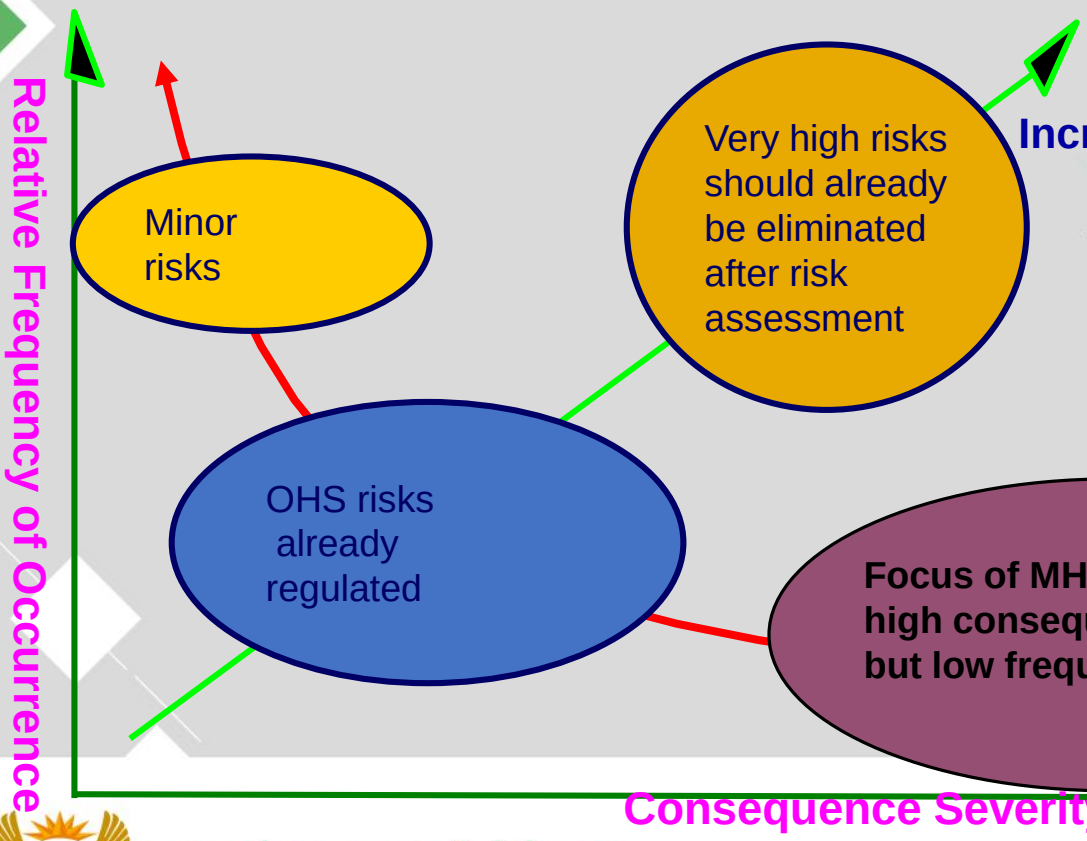
- Risk Assessment : Section 8 of the Act read with GSR 2
- Hazard: source of or exposure to danger
- Risk: probability that injury or damage will occur

risk = likelihood *impact

- Risk is therefore based on scoring and matrix's are designed to assist in scoring the risk
- distinction between high likelihood, low consequence events and low likelihood, high consequence events

Section 8 vs QRA



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- quantitative risk assessment comes with a new definition
- the term risk is referred to as “likelihood of conversion of a source of danger into actual delivery of loss, injury, or some form of damage
- involves both uncertainty and some kind of loss or damage that might be received
- the main difference between QRA methods and conventional scoring methods is the notion of uncertainty in the definition of risk
- Measurement of uncertainty is done by assigning a set of probabilities to a set of possibilities

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- “What is the risk?” we are really asking
- three questions:
  1. What can go wrong?,
  2. how likely is it to happen? and
  3. what are the consequences if it does happen?

  Answers:
  1. “risk scenarios”
  2. Probabilities

  Damage/harm that can occur

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- More formally, the risk, R, in MHI is the set of triplets:

R = {hSi , Pi , Xii}, i = 1, 2, ..., N

where

Si is a scenario identification or description;

Pi , is the probability of that scenario; and

Xi , is the consequence or evaluation measure of that scenario, i.e., the measure of damage

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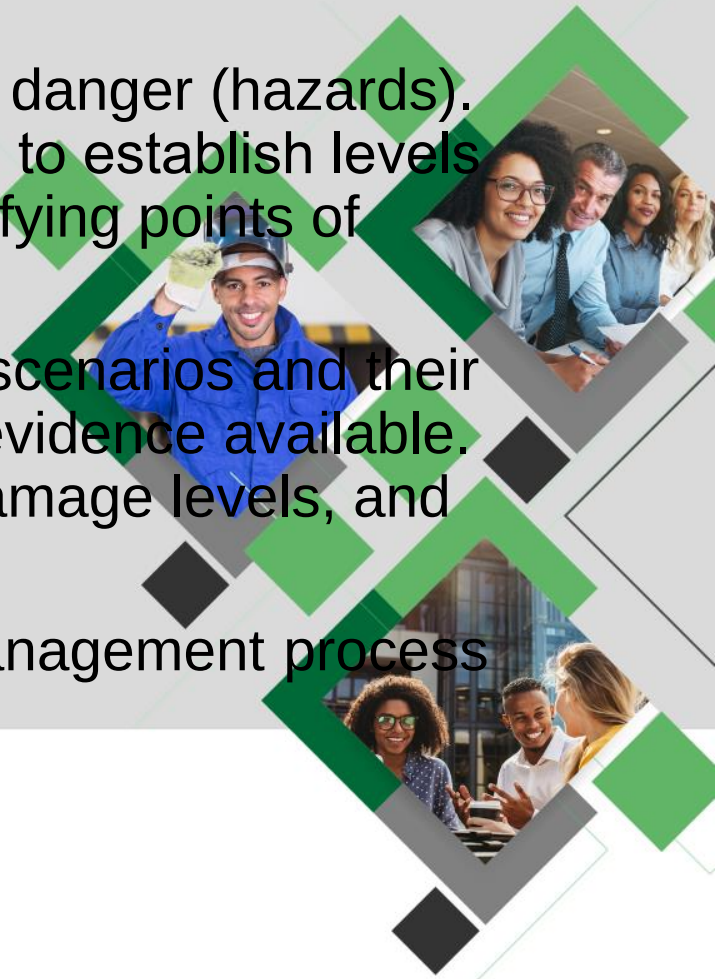
- Finding Risk Scenarios

1. Define the target system in terms of what constitutes normal operation.

2. Identify and characterize the sources of danger (hazards).
3. Develop “what can go wrong” scenarios to establish levels of damage and consequences while identifying points of vulnerability.

4. Quantify the likelihoods of the different scenarios and their levels of damage based on the totality of evidence available.
5. Assemble the scenarios according to damage levels, and present the results into risk curves.

6. Interpret the results to guide the risk management process



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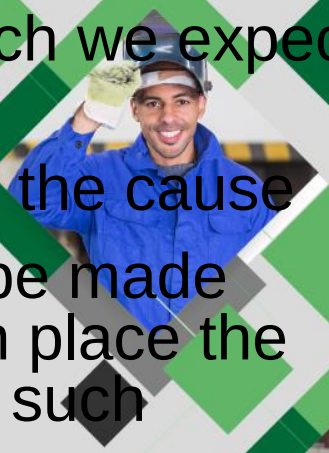
"ALARP" is short for "as low as reasonably practicable".

- Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it.
- Thus, ALARP describes the level to which we expect to see workplace risks controlled.
- MHI risks are not judged against impact the cause
- The judgement to tolerate risks should be made against the costs required, time to put in place the measures, accessibility or availability of such measures and the efforts required.



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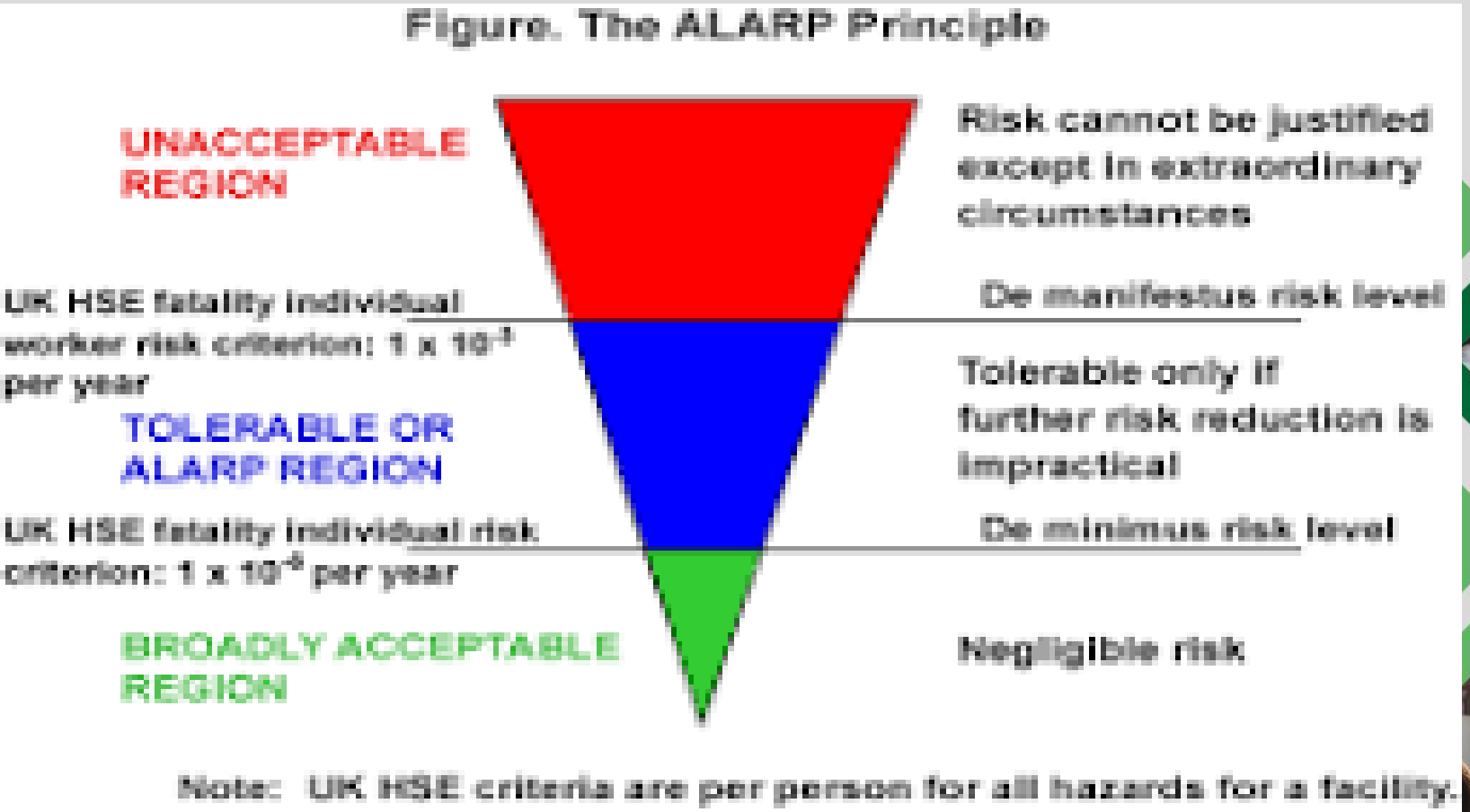

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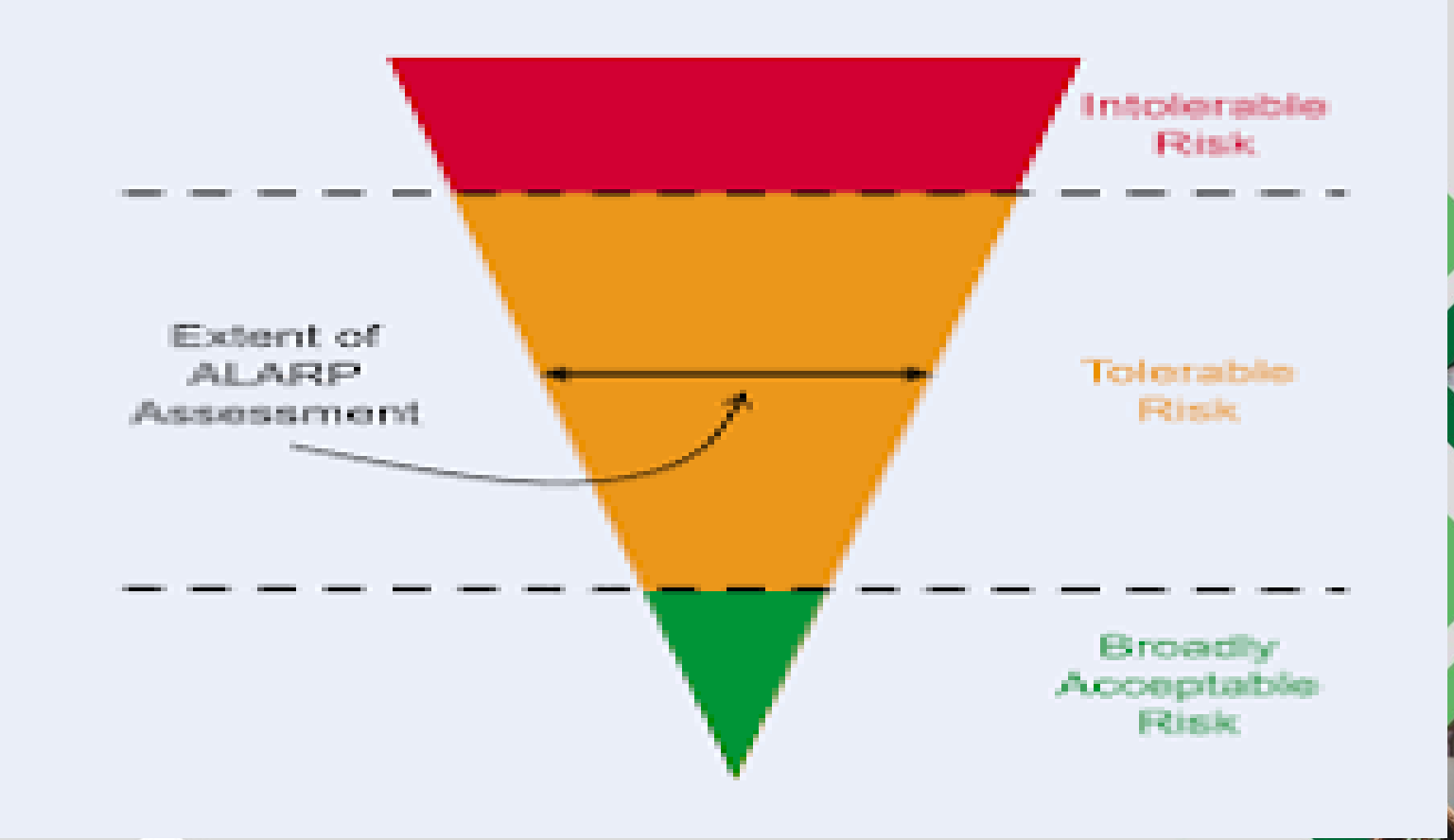

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- How do we then ensure that risk is reduced in MHI

Design for safety and identify major hazards areas within the installation

Use of ALARP principle

- competent persons : Approved Inspection Authority
- Suitable tools (relevant software)
- Advise LUP
- Environmental Authorisations
- Obtain approval from LG on installation suitability
- Approved methodologies : SANS 1461

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Quality Assurance

- SANAS (accreditation of inspection body)
- Audits (SANAS and sometimes by the Department)
- Developed a template for QRA report (Technical Requirements 54 version 6)
- Routine (day to day) OHS inspections
- Statutory maintenances, Management of Change
- Reassessment of MHI facilities due to revalidation as well as when change is effected on the facility

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CLASSIFICATION

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Classification

Chapter 1: N**amed Substances**

E.g.

	Low	Medium	High
LPG	20**t**	**50t**	**200t**

Chapter 2 : **Categories of Substances**

4 Hazards classes: Health**, P**hysical**, ~~Environmental~~ and Ot**hers

E.g.	Low	Medium	High
H1 Acute Category	**5t**	**5t**	**20t**

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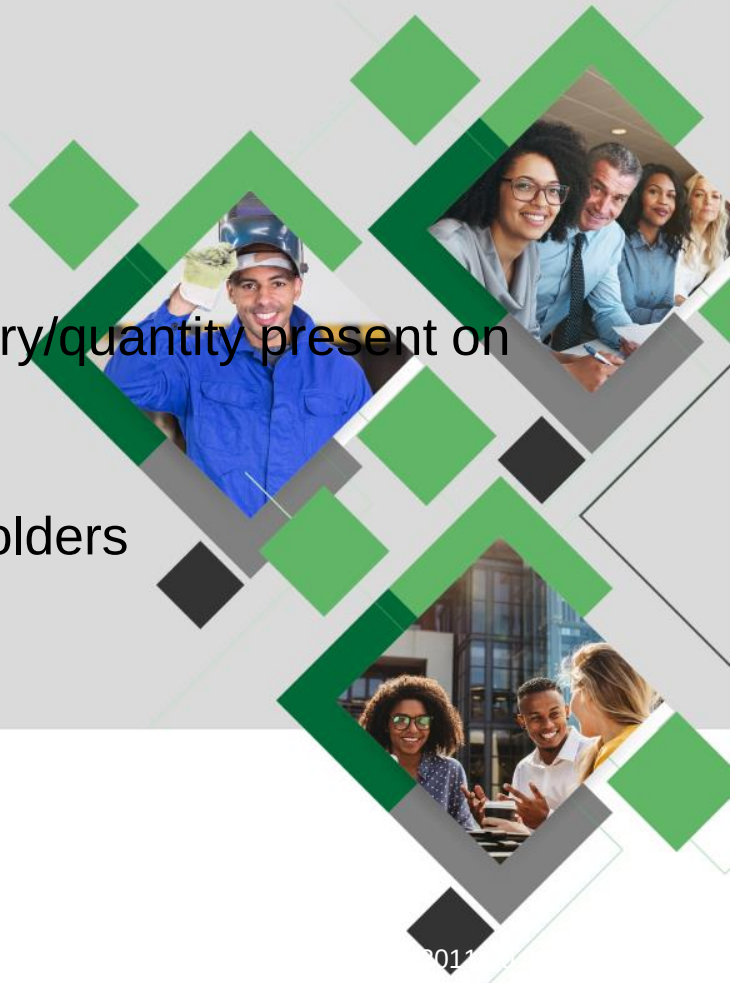
Major Hazard Installations Regulations, 2022

MHI/ establishments

- Three major hazard classes:
  - Class I- Low hazard establishment
  - Class II- Medium hazard establishment
  - Class III - High hazard establishment

- Classification based on maximum inventory/quantity present on site

- Inventory quantification is done by duty holders (AIA can assist)



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Multiple MHIs?

- Aggregation + 2% Rule

1. Aggregation Rule

- Multiple MHIs on one establishment, totaled to form one whole inventory that can be classified into a hazard class
- $\sum_{i=1}^{n} Qi/Qui$
  - -Qi – Quantity of material
  - -Qui – Qualifying Quantity in Annexure A
  - If $\sum_{i=1}^{n} Qi/Qui$ > 1 then decide either Low, Medium or High establishment

<1 = LOW

>1 = MEDIUM/HIGH

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Example 1:

A site with 4 tonnes of hydrogen (medium hazard threshold 5 tonnes) and 1 500 tonnes of flammable liquids meeting Category 6 of Chapter 3 of Annexure A (medium hazard threshold 5 000 tonnes).

The aggregation rule gives:

$\sum_{i=1}^{n} [\![Qi/Qui]\!]$

= (4/5) + (1 500/5 000)

= 0,8 + 0,3

= 1,1

As this result is greater than 1, medium hazard category applies.

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2. 2% Rule

- If quantity of substance is insignificant, it can be ignored when calculating relevant inventory for classification if:
  - ≤ 2% of qualifying threshold
  - Cannot initiate a major hazard

The 2% rule guides the multiple facilities on which small installations to ignore as they will not necessarily cause or initiate a major incident on the big installation.

And again on the worse case scenario, if the big installation collapses the impact of the small installation will be significant due to the impact from the big installation.

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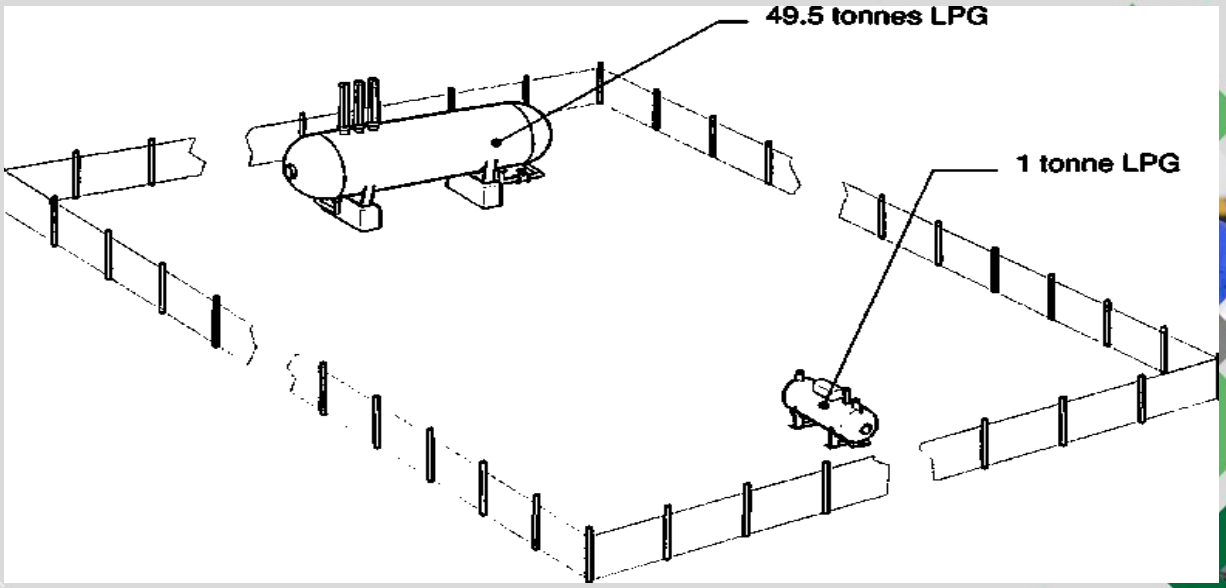
Example 2:

A site with 49.5 tonnes of hydrogen (MEDIUM hazard threshold = 50 tonnes) and 1 tonnes of LPG (does not meet any class)



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Results 2:

Aggregation:

- Large tank containing 49,5 tonnes of LPG, (medium hazard 50 tonnes), and a small tank containing 1 tonne of LPG located where the smaller tank cannot start a major event, then 1/50 = 2

- Here, 1 tonne is 2% of the qualifying quantity (50 tonnes), therefore it can be ignored and the establishment can classified as a **low hazard** even if the total inventory is 50.5 tonnes which is higher than the 50 tonnes.

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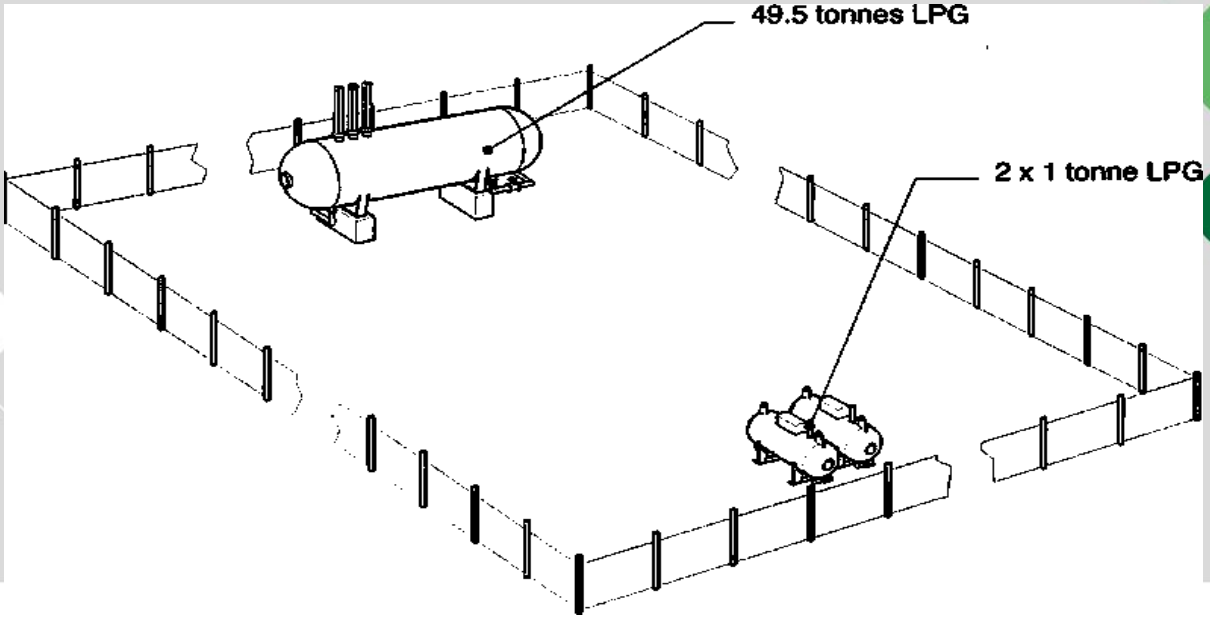
Example 3:

A site with 49.5 tonnes of LPG (MEDIUM hazard threshold = 50 tonnes) and 2 x 1 tonnes of LPG (does not meet any class)



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Results 3:

AGGREGATION:

- Large tank containing 49,5 tonnes of LPG, (Medium hazard 50 tonnes), and two small tank containing 1+ 1 tonnes = 51.5 Tonnes

RULE 2 %

- The small tanks are adjacent to each other but their separation from the large tank is sufficient to prevent the small tanks starting a major incident at the large tank.

- Both small tanks = 2% of threshold (50 tonnes), but as they are adjacent they should be regarded as one quantity of more than 2%, therefore the 2% rule does not apply. As the total quantity of 51.5 tonnes exceeds the medium hazard threshold, MHE applies to this establishment.

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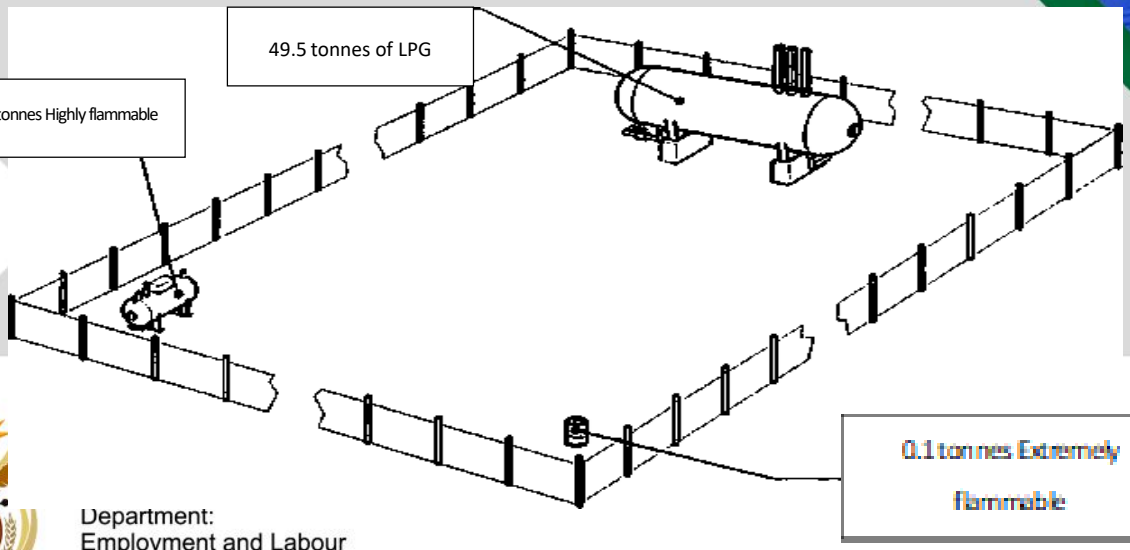
Example 4: *An establishment with-*

(a) a large tank containing 49.5 tonnes of LPG;

(b) a tank containing 0.9 tonnes of highly flammable liquid (medium hazard threshold 50 tonnes); and

(c) a tank containing 0.1 tonnes of extremely flammable liquid (medium hazard threshold 10 tonnes).:



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Results 4:

- Large tank containing 49,5 tonnes of LPG, (Medium hazard 50 tonnes), and two small tank containing 1+ 1 tonne of LPG located where the smaller tank cannot start a major event.

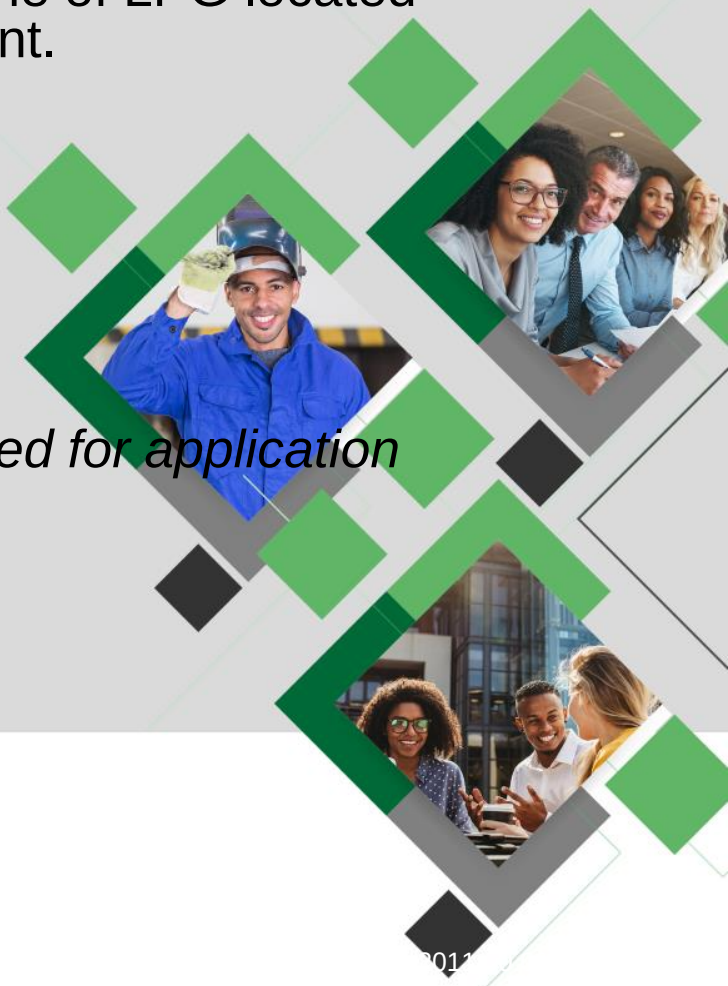
- *RULE 2 %*

  = 0.9/50+ 0.1/50 + 49.5/50

  = 0.018+ 0.002 + 0.99

  ≅ 1.8% + 0.2% +1% = 3%

- *As this is greater than 2%, they cannot be ignored for application purposes*
- Aggregation = *49.5 + O.9 + 0.1 = 50.5*
- *>1 = Medium Hazard Class*



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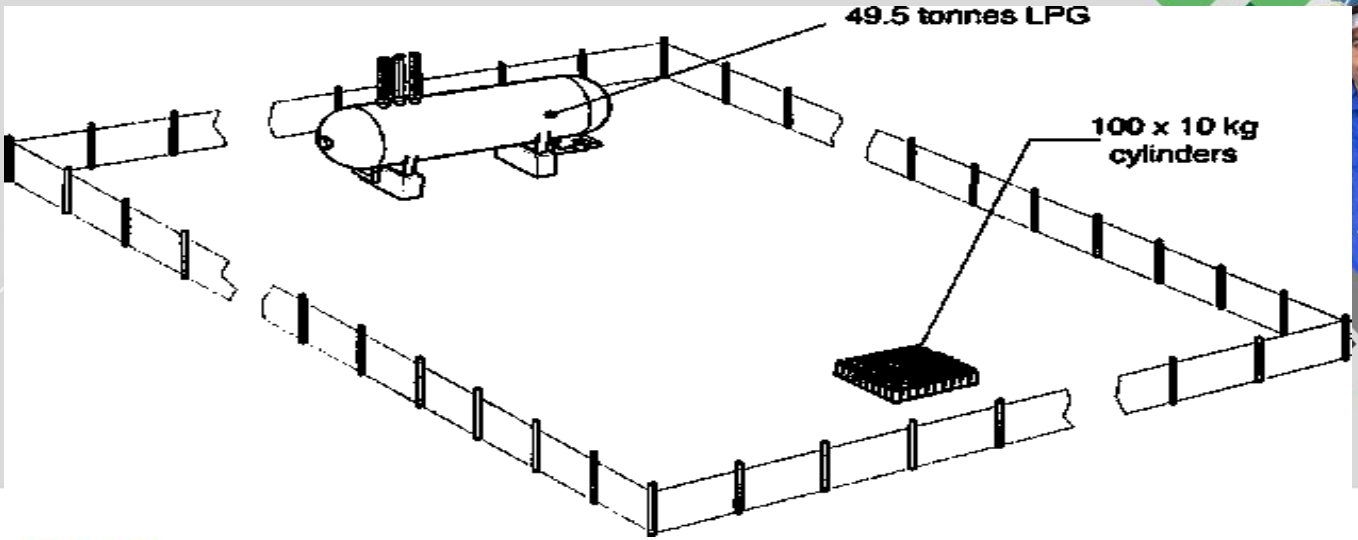
Example 5:

- *An establishment with-*

(a) a large tank containing 49.5 tonnes of LPG; and

(b) a compound containing 100 x 10 kg cylinders of LPG, i.e. 1 tonnes in total.



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Results 5:

- *The separation between the compound and large tank is sufficient to prevent the cylinders starting a major incident at the large tank.*

- *Each cylinder contains less than 2% of the medium hazard threshold (50 tonnes) and the total quantity in the cylinders is 1 tonne which is 2% of the medium hazard threshold. The cylinder compound cannot start a major incident elsewhere on site, so the 2% rule applies. Therefore, medium hazard MHE does not apply, which places this installation as a*

  low hazard category.

IMPLEMENTATION PHASE

- Existing MHI/establishments
- Phase 1: (31 January 2024)
  - 12 months
  - Emergency Plan
- Phase 2: (31 January 2025)
  - 24 months
  - Registration of MHI/establishment
- Phase 3 (31 January 2026)
  - 36 months
  - Technical Requirements

Implementation:

- new MHI/establishments
  - immediately upon the Regulations being in force

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Planet MHI

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Thank You…

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